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J. H. PARKER

THE DIFFERENT MODES OF
CONSTRUCTION EMPLOYED IN
ANTIENT ROMAN BUILDINGS.

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EMPLOYED

IN ANTIENT ROMAN BUILDINGS

AND THE

PERIODS WHEN EACH WAS FIRST INTRODUCED

A LECTURE

DELIVERED BEFORE

BRITISH ARCHÆOLOGICAL SOCIETY

OF ROME

AT THE BRITISH CONSULATE

on the 26th December 1867

BY

JOHN HENRY PARKER F. S. A.

HON. M. A. OXON.

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The Building materials employed in Rome, besides Marble for ornament, are Stone, Clay for bricks, Sand, Lime.

The varieties of stone are

I. Tufa a Volcanic sand-stone generally soft and white or light red called by Vitruvins *Lapis ruber, Tophus*.

The antient Quarries of this are in the Coelian, Aventine, and Capitoline hills, the modern ones in the Canpagna.

The walls of Romulus are entirely of this material, and were probably built from Quarries in the Palatine hill itself.

II. Lapis Albanus now called *Peperino*, also a Volcanic sand stone but hard and rough, the surface covered with knobs of flint like pepper-corns.

The antient Quarries are near Alba-Longa on Monte Cavo. The modern ones are at Marino, the Colour is grey with a tinge of green. The Mamertine prison, the Agger of Servius Tullius, and the Temple of Antoninus and Faustina are of this material.

III. Lapis Gabinus called Sperone, this resembles the Peperino but, it is not always easy to distinguish them. The antient Quarries are at Gabii.

The triple arch of the Cloaca Maxima and the substructure of the Tabularium are of this material. These two stones resist fire and were ordered by Nero to be used. A. D. 64. after the great fire in Rome.

This is also believed to have been used originally before even the Peperino.

IV. Lapis Tibertinus ealled Travertino or Travertine, a lime stone, the antient Quarries of which are at Tiber or Tivoli near the Anio.

It is white when new and becomes a warm yellow. The tomb of Cecilia Metella and the Colosseum are well known examples of this Stone.

V. Silex called Selce a basaltic lava resembling iron in colour and almost as hard, it gives out sparks when struck with iron. (This name is applied also to Flint).

Several currents of this Lava cross the Campagna coming from the Crater now the Lake of Albano and extending near to Rome: one reaches as far as the tomb of Cecilia Metella two miles from Rome on the Via Appia. It is used for concrete and pavements. It was first used for this latter purpose in. A. U. C. 578. (B. C. 145). as mentioned by Livy (41. 28).

VI. Pumex or Pumice stone, is a very light material and is used for vaulting.

The Quarries are on Mount Vesuvius. The vaults of the Colosseum and the Pantheon are of this light material.

VII. Brick. The walls of Babylon and Persepolis and other antient cities were of Brick, but of sun dried bricks only. The Roman bricks are well burnt in kilns. The earliest are made from the mud of the Tiber. They are not found before the time of Augustus, and were at first used frequently as external brick linings to Concrete walls, sometimes to be afterwards faced with marble slabs.

The most antient bricks are flat like tiles mixed with Pozzolana sand very well made and very hard.

VIII. Materia or Mortar, made with lime and sand. The sand is of two kinds Fossicia, or river sand; and Pozzolana, *(Pulvis Puteolanus)*.

The Quarries of this sand extend over the Campagna on the eastern and southern side of Rome often many miles long in corridors or roads always at the same level often underground for miles, the entrances to them are walled up when they are abandoned. (Some of these were afterwards used for Catacombs) The best Pozzolana sand is always rough, it crackles in the hand when rubbed and leaves no stain on a white dress, as Vitruvius mentions.

The *Materia* or *Mortar* if well made consists of three parts of sand and one of lime. The lime should always be quite fresh, the mortar then becomes as hard and durable as natural concrete stone. Pounded brick is often used instead of Pozzolana sand in countries where the sand could not readily be obtained. Whitewash was made with River Sand and broken pottery and should be half lime according to Vitruvius.

The large stones were originally held together with clamps of metal, or with bolts of wood let in between two stones, as in the Aqueduct of Claudius, and in the great wall of the Forum of Augustus where they are of wood only. In the Colosseum they were iron rivets which when they rusted split the stone and fell out or were torn out as some say. In the Pantheon they were of bronze.

CONSTRUCTION.

Opus Quadratum. This is the earliest kind of construction in stone and should be divided into several periods.

The stones are squared but not necessarily square, they are usually oblong and in the earliest examples, these large stones are laid alternately length-wise and crosswise like modern bricks.

The earliest and best example is the wall of Romulus on the Palatine which is decidedly of Etruscan character, the same as the walls, of Fiesole, of Perugia, Cortona, Volterra and other Etruscan cities.

In Rome the only material for these early walls is Tufa. The stones of this earliest mode of construction are also the largest; as time goes on they gradually become smaller. In the very early walls also the stones are split off the rock with wedges and not cut with any iron tool.

The stones are put together without mortar or cement of any kind, and are supported by their own weight only. This earliest style is believed to have been continued to about a century after the time of Romulus. The next division differs but slightly from it, the only difference is that the stones are smaller and not exclusively of Tufa; the Peperino from Albano now comes into use.

The earliest example after the wall of Romulus is the wall of the Kings on the Aventine sometimes attributed to the Latins when they first settled on this hill; and the celebrated Agger of Servius Tullius, The Pulchrum Littus on the bank of the Tiber, and the wall of the Kings under the church of S. Anastasia on the Palatine by the side of the Circus Maximus. Portions of the old walls of the time of the Kings against the cliffs of the hills in various parts of Rome, also belong to this second division of the Etruscan style of construction, the stones being gradually smaller as the buildings were later. In the later buildings of this style the stones are cut and not merely split.

The same style is continued in the early part of the Republic. The substructure of the Tabularium on the Capitol and the Mamertine prison are fine examples. In the time of Camillus after the capture of Veii there is a marked improvement in the art of building, the stones are well cut with the saw and closely fitted together as in the triple arch of the Cloaca Maxima on the bank of the Tiber *inserted* in the Pulchrum Littus.

The three Temples in the Forum Olitorium, now in the church of S. Nicolas in Carcere, both in the crypt and in the walls, and on the roof; all belong to this style though not all exactly of the same date. These are of the earliest stones either Tufa, or Peperino, or Gabine, not Travertine. The arcades of the earliest Aqueducts, the Appia and the Marcia, are of the same style, that of Claudius is of later character though still of large stones, and looking a good deal like the earlier ones at first sight, but the material is Travertine. This mode of construction continued for a long period and to a certain extent continues still where similar building material is found. Tufa splits naturally in the cliffs or quarries into masses, similar to those used in the earliest construction and requires only to have wedges driven in to separate these blocks entirely from the rock. We must not therefore conclude that buildings of this early construction are always of the same early date every-where. In Rome these early walls are constantly built upon, or built against, in later times by walls of the Republic, or of the Empire, and we are therefore driven back to the time of the Kings for these early substructures. But we must always pay attention to the history and the circumstances in each case, before we can decide upon the age. When the building material is different the construction of a wall is necessarily different also.

There is a construction of comparatively small stones of Polgyonal irregular forms closely fitted together without cement but with small splinters of stone wedged into the joints when necessary. This construction is common in some districts and is sometimes perhaps contemporaneous with the wall of the Kings and is called Phœnician but this construction also is of all periods where that sort of building material is found. In many districts this material is the hard mountain lime-stone. In Rome it is the Silex or Lava and this construction is very rare in Rome. A small portion on the Viminal is I believe the only example known there, but there is something resembling it in the Emporium.

It is common in some parts of Ireland, and I have had a Photograph of this peculiar construction sent to me from Ireland as *undoubtedly Phœnician.* This Photograph I happened to receive at Hawarden Castle where the old castle of the time of Edward the first of England has a portion of the keep of exactly the same construction, and I have seen the same construction used in railway cuttings to keep up the earth, at the foot of the Alps, where the same material happened to be found, within the last few years. This shows that we cannot depend upon rude natural construction *alone* for the date of a building. In such cases we must have historical evidence. It was sometimes used by the Etruscans and other antient nations where this building material is found. It is the natural construction of this material and therefore the cheapest, and is used at all periods.

Another mode of construction almost resembling this is that called by Vitruvius *Opus Incertum* and *Opus Antiquum,* but in this the stones are set in lime mortar; and this brings us to another period. Lime mortar was not brought into general use until two or three centuries before the Christian Era, and when first introduced it was used in profusion and in excess; the advantages of it were seen at once. Walls could be built of rough stone without the trouble of cutting it and be as strong and as durable as the best wall of cut stone.

The earliest example remaining of this mode of construction, usually called *concrete,* is believed to be the lofty wall on the Palatine hill by the side of the wall of Romulus, this is extremely rude, there is no attempt at ornamenting the surface, at a distance indeed it has rather the appearance of being panneled but on a closer inspection this appearance is found to arise from a number of large vertical grooves, where beams of wood have been inserted originally to support the wall and the cliff behind it, before the lime grouting had set, which indicates that the builders of this time were not accustomed to the material and had no confidence in the strength of such a wall. The wood has decayed centuries ago and has left only the grooves in which the beams were placed, the wall will stand as long as the hill behind it if left alone. There are a few horizontal grooves also where cross beams have been laid, and in one of these a terra cotta water pipe has been laid to convey water to the reservoir of Romulus behind his wall adjoining and, as that reservoir went out of use as soon as the Aqueduct was carried to the Palatine by Nero, it shows that the wall was standing and the beams decayed before that time. This mode of constructing concrete walls with beams of timber let in to strengthen them was long continued for foundation walls.

It avoids the bad effect of the settlement which always takes place when the water evaporates which had been used in the lime grouting, and is used for foundation walls still. Some persons consider that this lofty wall against the cliff of the Palatine was merely a foundation wall of one of the series of magnificent terraces of the Cœsars, against the sides of the Palatine, and that such a wall may be of any period. This might be true, but after the Aqueduct was brought to the Palatine there would be no need for the horizontal water pipe, and to suppose that a wall fifty feet high, and that against the upper cliff of the hill, was only the foundation of a great brick terrace seems to be going rather too far in the ideas of the magnificent structures of the Cœsars. If the wall had been against any of the lower cliffs, belonging to the lower terraces or the Zig zag roads, this theory might be allowed to be true, but looking at the actual situation of it on the summit of the hill, this does not seen probable — The Cœsars used this wall as they did the wall of Romulus, to support the back of this upper terrace, but they did not build either the one or the other.

The discovery of lime mortar and concrete soon produced quite a revolution in the art of building, the earliest *dated* example of the use of lime mortar is believed to be the Emporium on the bank of the Tiber B. C. 175 and the construction marks an early period in this kind of the art of building but not the earliest. The surface of the wall is faced with a rude kind of reticulated work or net work. The mass of the wall is concrete of rough stone and mortar, but the rough surface is not allowed to appear. It is faced with reticulated work on the surface, with arches and corners of cut stone of Tufa, in pieces rather larger than modern bricks.

The same construction occurs in the *Muro Torto* or Palace of Sylla near the Porta del Pópolo at the northem extremity of the walls. From this time forward the mass of a Roman wall is almost always of concrete though generally faced with reticulated work or brick.

Concrete once introduced was so evidently convenient and economical that its use soon became universal and it has never been discontinued.

The reason that the Roman walls are so durable is, that they are built of concrete, and the lime was burnt on the spot and used quite fresh. Every hour that lime is kept it loses some of its strength. It absorbs moisture from the atmosphere which causes it to expand and chrystalize with wonderful rapidity and after that chrystalization has taken place its binding power is gone. The more rough the material that it has to combine with and bind together the stronger is the concrete.

The circumstance of the Romans having the advantage of the Pozzolana sand and of broken bricks to combine with the lime made their walls so durable.

Lime mortar is not found in the Pyramids or the antient Temples of Egypt, nor in any buildings in Oriental countries before the Christian Era; nor in the Grecian Temples nor in the Temples at Paestum, which are contemporaneous with the time of the early Republic at Rome. It occurs in the wall that encloses the Temples at Paestum but that is Roman and of much later date than the Temples, it enclosed the city, the houses of which must have been of wood only, as there are no vestiges of them, if indeed there ever was *a city* there. Those Temples appear to have been built by a Greek colony under the influence of Greek priests as a place of Pilgrimage for the Italians, with a view to the conversion of that people to the Greek Religion, and to have succeeded in their object, to a considerable extent.

Before the use of lime mortar it was difficult to build a habitable house of stone, and bricks were a subsequent invention, for the use of which lime mortar was almost indispensable. The early inhabitants of the earth lived either in caves or in wooden huts.

There is reason to believe that the Romans were the best Military Engineers of their day and owed a great deal of their rapid progress and their power to that cause.

Their soldiers could construct a Camp so as to make it secure in a single night, in case of need, and after the introduction of lime mortar and concrete walls, they could soon convert an entrenched Camp into a permanent Castle. Their language makes no distinction between a Camp and a Castle, either is a *Castrum*, and whether it was permanent or temporary depended upon circumstances, so that in reading antient authors it is often difficult to tell whether a temporary Camp or a permanent Castle is meant.

When lime-stone was ready to hand, for an army to make some lime kilns, burn some of the stone into lime, and pile up the rest in horizontal lines between boards into which the lime grouting could be poured and the whole bound together into an everlasting concrete wall, would be an affair of a few days or a few weeks only. Concrete was so convenient for military purposes that it was always used where the materials were found, and in some cases the military engineers had more confidence in it than they had in stone. A singular instance of this occurs in the Castle of Carcassonne in the south of France built in the thirteenth century, where the walls of the Castle are built of stone, but the lintels of the doors are made of concrete cast in wooden boxes of the size required, the artificial concrete being considered stronger than the natural stone. In one or two instances this concrete has split, but, in general it remains perfectly sound, and the splits are probably antient, caused by settlement of the lime in the first instance, the blocks having been used quite fresh. Concrete in masses is always liable to split in the settlement, but after the settlement has once taken place the split goes no further, although it often looks dangerous, and many a strong old wall has been destroyed by an ignorant architect or builder because it *looked* dangerous after it had stood for centuries with the splits in it. The surfaces of these concrete walls in Rome were faced with reticulated work set in frames of bricks, in buildings of the time of Augustus and throughout the first century down to the time of Hadrian. The small blocks are driven into the concrete while it is wet before the lime has set and the whole wall including the smooth surface is thus bound together. Some of the finest walls in the world are formed in this manner and they are as durable as natural stone, or natural concrete-rocks.

In the time of Augustus thin layers of bricks are introduced at intervals to bind the surface material well into the concrete mass.

The well known boast of Augustus that he had found Rome of brick and left it of marble has been supposed by some Roman Antiquaries to have been mere bombast, as it would apparently be more true to say that he had found it of stone and left it of brick, for there is very little brick to be found before his time. It is however probable that the smooth surface of brick and reticulated stone was in many instances introduced to receive the plates of marble casing or veneering which could not be well fixed to the rough surface of the concrete.

The Opus Reticulatum is often supposed by casual observers to be of brick, as the small diamond shaped blocks of Tufa look very like brick at first sight, they are however of stone with a flat surface and wedge-shaped at the back, as has been said.

The facing bricks of the time of the early Empire are also commonly triangular with the long flat surface outwards and the point inwards driven into the concrete before it sets so that the whole wall becomes one solid mass and it is very difficult to separate the flat surface from the rough concrete mass behind it. The wall of Augustus which enclosed his Forum is a fine stone wall of cut stone, the blocks very large and the edges chamfered off, forming what is called Rustic work. This at all events can never have been faced with marble, but an older wall adjoining to it in the Forum of Nerva has been faced or veneered with marble, and a marble cornice built upon it with marble columns in front of it. This has been done in the time of Nerva preserving the substantial old stone wall concealed behind the marble casing and only brought to light by the removal of the marble slabs to make the fountain on the Janiculum in the sixteenth Century. The arcade of the Aqueduct of Claudius is also of cut stone resembling Rustic work, and stone continued to be used side by side with brick during the first and second centuries.

The Colosseum is faced on the exterior with cut stone *(Travertine)* though the main structure is concrete, and the inner walls are faced with brick. There has evidently been an interruption in the work for some years, and the parts begun in stone are finished in brick, so that before the Colosseum was completed brick had become the usual facing of the walls not faced with marble.

The Brick work of the first century is the finest brick work in the world, the bricks are well baked and made flat like tiles and are laid flat in the walls excepting round arches when they are placed edgeways.

The earliest bricks are said to have been made from the mud of the Tiber (as has been mentioned). This was a natural mixture of clay and sand, and the numerons slaves of the Empire are said to have been employed in making bricks when not other wise occupied. These bricks are usually stamped in the centre with the name of the maker, and the owner of the property where they were made. There is a collection of some hundreds of these brick stamps in the Vatican Museum and a distinct work has been publised, upon them, Those of the time of Trajan and Hadrian are among the most common; those of Nero are considered the best. These stamps can only be seen when the brick has been detached from the wall, which is often no very easy matter. Another easy test of the date of a brick wall has been found by the careful observation of Roman Antiquaries. This consists in placing a foot rule, or a yard measure against the wall as it stands and counting the number of bricks in a foot, or a yard, including the mortar between them. In the best brick work of the time of Nero there are usually ten bricks to a foot; as the work is later the bricks become thicker and more mortar is put between them, until in the time of Constantine and in the fourth century generally there are frequently only four bricks to the foot as in modern brick work. The quality of the brick is also another test, the early bricks are made harder and better and of a finer texture than the later ones, which become coarse and more spongy in appearance. In the early work the mortar between the bricks can hardly be perceived, in the later work it is an inch thick and often more.

It has been observed in the walls of Rome that the early bricks are generally yellow, but no reliance can be placed upon this; the colour of the bricks depends on the clay of which they are made. Some clay becomes red, and other clay becomes yellow and bricks of the two colours are sometimes so intermingled together that it is impossible to suppose they can belong to different periods; the very fine brick work mixed with reticulated work does not occur after the time of Hadrian; the falling off is hardly perceptible but in the Colosseum towards the end of the second century the brick work is not so fine as in the previous century. - In the third and fourth centuries although most important buildings were still erected the brick walls in them are of a very inferior quality to what had gone before. - The Thermæ of Antoninus Caracalla and of Diocletian, and the grand Villa of the Gordiani called the Torre de' Schiavi, splendid buildings as they must have been, are not equal in the construction of their walls to the Villas of Hadrian, or of Septimus Bassus, or the palace and arcade of Nero, or the Thermae of Titus; or the Castra Praetoria, the Lateran, the Porta Ardeatina all in the walls of Rome and all of which have the beautiful brick work of the first century.

This splendid early brick work is called by Vitruvius *Opus Lateritium.*

From the time of Hadrian it became customary to add the names of the Consuls to that of the owner of the kiln or of the slave who made it, A sufficient number of stamped bricks were used in each building to record its date with certainty, but after the seat of Empire was transferred to Constantinople and the decay of Rome began, this useful custom was gradually discontinued. During the time that the custom lasted the greatest persons in the Empire even members of the Imperial family were not ashamed to have their names stamped on the bricks made at their kilns which were valuable property, and the word Praedium which we so often meet with in the history of that period often includes the brick Kiln or furnace. Among the great personages whose kilns are known by the stamps upon them was Domitilla Lucilla wife of Annius Verus and mother of Marcus Aurelius Augustus the head of the great family of Verus or Varius who resided in the Palace called the Sessorium (now the Monastery of Santa Croce in Gerusalemme), for more than a century, and who built the Circus Varianus now destroyed, and the Amphitheatrum Castrense, the walls of which are still standing having been incorporated in the walls of Rome. — Another mode of construction which occurs in many parts of the walls of Rome, and in the Circus of Maxentius and in many other buildings is called *mixed,* because it is a mixture of rough stone and brick in alternate layers at regular intervals.

This is usually attributed to the fourth century, because of this dated example of the beginning of that century, but it occurs also at Pompeii and in many parts of the substructure of the wall of Aurelian; which in various places is evidently built upon an earlier wall.

This mode of construction appears to be a natural developement of the mere concrete wall which forms the core or central mass of nearly all Roman walls. The alternate layers of bricks or tiles made it more easy of construction and more firm at once, without the liability to split, as the lime and the stones settled down, to which a great mass of concrete is always subject. I suspect that this mode of cheap construction for foundations, cheap and strong at the same time is as old as the time of Augustus, and that it continued in use long after the time of Maxentius and Constantine. It is the mode of building most commonly adopted in Roman walls in England, and in Gaul. Like other cheap natural modes of building it affords in itself no evidence of date, other things must be taken into account in judging of the age of such a wall. It is known in Rome as the style of the *Decadence*, because it was much used at that period, but it may be seen also in some of the foundation walls of Hadrian's Villa near Tivoli and at Ostia in tombs of the second century.

Small pieces of Tufa of the form called a parallelogram that is of the shape of a modern brick are used for facing the concrete walls from the very earliest period. They occur in the Emporium and in the Muro Torto forming borders to the panels of reticulated work. They are often mistaken for grey bricks but the material is found to be Tufa on examination and they are generally considerably larger than modern bricks. This kind of facing continued to be used occasionally at all periods, and was extensively revived in the Middle Ages under the name of *Opera Saracenesca*. This is the most common mode of facing a wall from the ninth century to the fifteenth. It is supposed to have passed from Rome to Byzantium and from thence into many eastern countries and to have been largely used by the Saracens in their fortresses and by them brought back to Rome in the ninth century, if it really ever went out of use there. It was adopted very commonly for the Castles and houses of the Barons of the middle ages as in the Castle of Hildebrand in the eleventh century long a great stronghold of the Barons in the Trastevere. It occurs also in the castle of the Gaetani around the tomb of Cecilia Metella and in the castle of the Savelli on the Aventine in the twelfth, thirteenth, and fourteenth centuries; and in the buildings of the Monastery of S. Sisto Vecchio in the seventh.

The Brick work of the Middle ages in Rome is a fair imitation of that of the Empire, especially that of the twelfth century. Walls of that period are often mistaken for walls of the Empire by very good antiquaries, if they have not given special attention to the subject of construction. Nibby one of the best Roman Antiquaries of the last generation describes the Porta Ardeatina in the walls of Rome as of the tenth century, it is distinctly of the first, of the time of Trajan. One of the best living Antiquaries in Rome for all church subjects assured me that the walls of Rome were entirely the work of the Popes and pointed to their arms or their names on many parts of them, but a more careful examination of them shows that these belong to repairs of small parts of the walls only and are generally only skin deep, a repair of the external facing of the wall only. In many instance the double corridors of Aurelian one over the other remain within the new skin supplied afterwards. In those places where the wall had been battered down or pulled down by the Goths *an* onter wall has been rebuilt for the sake of the Octroi duties and for the defence of the city against the brigands but it has never been thought necessary to rebuild the corridors in those parts. The interior of the wall where it has been thus rebuilt is mere rubble and rubbish. With the exception of the Bastions and walls of San Gallo in the sixteenth century, which are fine fortifications of their.period.

There was a great attempt at the Revival of Architecture and the other arts in Rome in the time of Charlemagne as he is commonly called, or Charles the great as Mr. Freeman says we ought to call him. Three churches were built or rebuilt at that period in Rome, S. Prassede, S. Cecilia, and S. Maria in Domnica, all built in the first half of the ninth century and faced with very good brick work but not much better than that of the seven churches built or rebuilt in the eighth century after the damage done during the siege of the Lombards. The portions of the sixth and seventh centuries which remain in the churches of that period are a bad imitation of the Imperial construction. The construction of the eight churches of the fifth century of which we have considerable parts of the walls remaining, is of much better brick work as may be well seen at S. S. Giovanni e Paolo, and S. Stefano Rotondo.

Something remains to be said of the marble facing of the Temples, the Palaces and the Thermae. It is a mistake to suppose that marble was commonly used as a *building material* in the time of the Republic or of the Empire. The core of the wall was always of stone and only faced with marble, generally in slabs only, sometimes, but rarely, in square or oblong blocks. The cornice and columns are of marble, all that was visible was so, but the core of the wall of the cella was generally of stone and the old stone cella of very early date, sometimes remains when the ornamental part has been rebuilt. A good instance of this occurs in the church of S. Maria in Cosmedin, formerly the Temple of Mater Matuta in the Forum Boarium where the wall of the cella remains in immense masses of stone of the time of Servius Tullius (A. U. C. 175, or B. C. 578) with three apses to the choir and aisles of the church *scooped out* of it. The columns and cornice have been rebuilt more than once (in A. U. C. 546 and 663). The columns and cornice now built up in the wall of the church probably belong to the last date. Some of the capitals which had been destroyed have been curiously imitated when the church was rebuilt in the fifteenth century.

The early Temples and the tombs of the Scipios are of stone only. The ruins of a Temple at the top of the Tarpeian rock, (now in the garden of the Prussian Embassy) seem to belong to the original Temple of the time of the later Kings. The three temples incorporated in the church of S. Nicolas in Carcere have been already mentioned they are all of stone, and all of the time of the Republic, but not all of the same period. That of Spes was founded in A. U. C. 229 in the early days of the Republic and the original foundation and substructure remain. It was rebuilt A. U. C. 492 and a part of the work of that period also remains. Those of Juno Sospita built A. U. C. 559 and Pietas A. U. C. 573 are of later character though still of Stone. Marble was not introduced until just after this period, the earliest mention of it is about a hundred and fifty years before the Christian Era or twenty years after the last of these three Temples.

The great Lions heads of the Etruscan style of Sculpture in the port of Rome on the Tyber made 180 years before the Christian Era are of stone not marble. The arcades to carry the Aqueducts, and the Bridges of about this period are entirely of stone not marble. — The walls of the Forum of Julius Cæsar and of Augustus are also of stone as already mentioned. The Cloaca of Agrippa has a brick vault, his Pantheon and the remains of his Thermae are also faced with brick, the marble portions have been rebuilt at a later period.

The curious tomb of Eurysaces the Baker is faced with marble and has marble sculptures. The Portico of Octavia has marble columns and a marble cornice, the walls are of brick.

The construction of walls of the thirteenth and fourteenth centuries in Rome is very inferior to that of buildings of the same periods in England and France.

The arch of Janus rebuilt A. D. 50. for the third time is faced with marble. The theatre of Marcellus is of stone. The arch of Drusus and the arch of Augustus in the Porta Tiburtina, are of stone. The arch of Dolabella is the earliest *dated* building of the Christian Era its date being A. D. 1. according to some authorities, A. D. 10. according to others. It is of massive stone construction, the stones well cut and closely fitted together, but the work is quite plain and has a very early look with it almost like work of the Kings. The Temple of Fortis Fortuna on the Tyber in Cœsars'Garden near the Forum Boarium, (now near the bridge and the house of Cola di Rienzi) was entirely rebuilt in A. D. 15. and the existing temple, (now the church of S. M. Egyptiaca) is of this period, and one of the best examples of pure Ionic in Rome the construction is of stone well cut, with fine joints.

The walls and the shops round the Forum of Trajan are of stone, the columns of the Basilica Ulpia in the middle of it, the great column, and the ruins of his Temple to the north of it are chiefly of marble.

The great Mausoleum of Hadrian was faced with marble, but the mass of the construction is of concrete, now faced with stone, and the incline within the outer wall is faced with brick. The fine Temple of Marcus Aurelius (now the Custom house) has marble columns and cornice, but the main structure is of stone. It was built. A. D. 170.

The round temple of Vesta in the Forum Boarium is of the same period and is faced with marble. The magnificent Thermae of Antoninus Caracalla were cased with marble, to a great extent, this has all been stripped off for modern purposes and we have only the brick walls and the plaster with the marks of the marble slabs remaining, but enough remains to show the magnificence of Rome at the beginning of the third century of the Christian Era.

The Thermae of Diocletian are of the end of that century and marble facing has been extensivley used there also, but less attention was paid to the construction of the walls and the brick facing.

The circus of Maxentius, with the tomb of his son Romulus. The arch of Constantine stolen from that of Titus in the circus, the remains of his Thermae, and of his Basilica or great Market hall although on a magnificent scale show a rapid decline in the arts of building and decoration.

This brings us again to the churches of the fifth century and later before mentioned. These and the Mediœval churches in Rome generally are built of concrete walls faced with brick on the exterior and plastered and painted within, and enriched with marble columns taken from the ruins of the buildings of the Empire. There are many hundreds of antique columns in Rome used again in the churches to support the clerestory walls, and for ornament.

The painting of the interior has generally been renewed from time to time, according to the taste of the age, but the mosaic pictures in the apses, and the marble columns have generally been respected (though not by any means always), there are several instances of marble columns being encased in square brick piers in order to paint the surface of them as at S. Pudentiana in the 12th Century and this has been done in some instances in quite recent times.

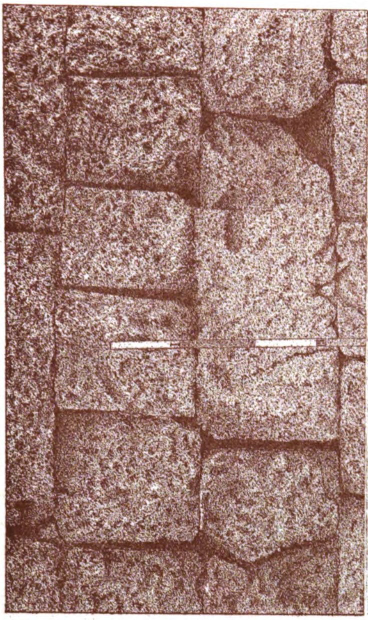
◆

NIHIL OBSTAT
Rev. D. Tobias Kerby Censor Deputatus.

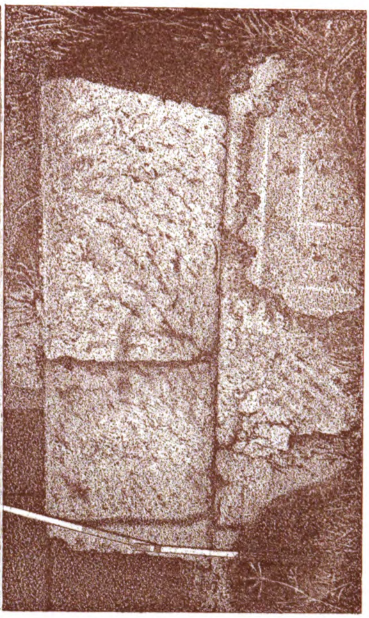
IMPRIMATUR
Fr. Marianus Spada O. P. S. P. A. Mag.

IMPRIMATUR
Petrus Villanova-Castellacci Arch. Petr. Vicesgerens.

PL. 1.

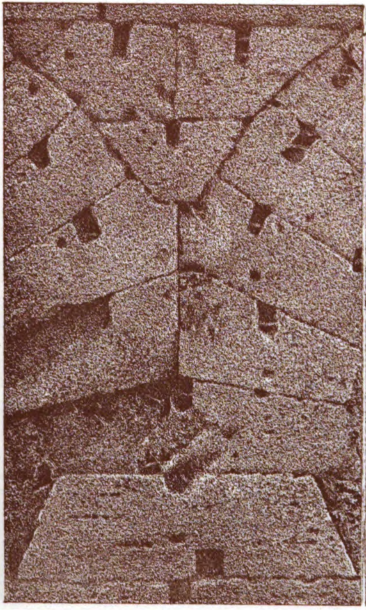


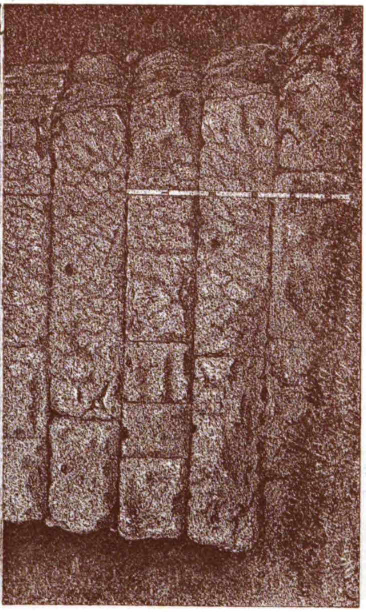
Opus Quadratum
Murus Romuli in Palatino B.C. 750.



Agger Servii Tullii B.C. 564.

Opus Quadratum Aevi Imp.
Arcus Julii Caesaris B.C. 47.



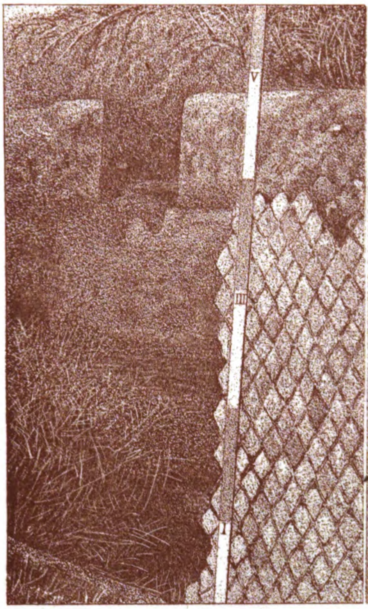


Aquae-Ductus Claudii A.D. 50.

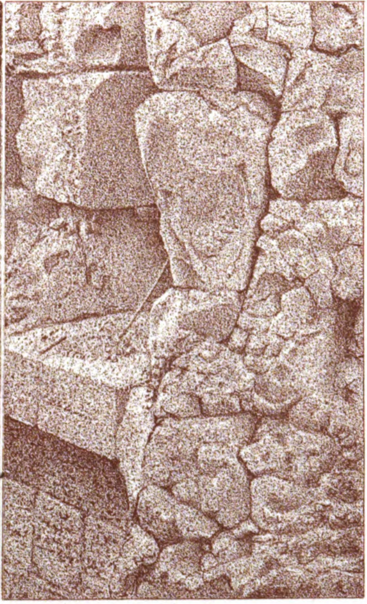
J. Jobbins

PL. 2.

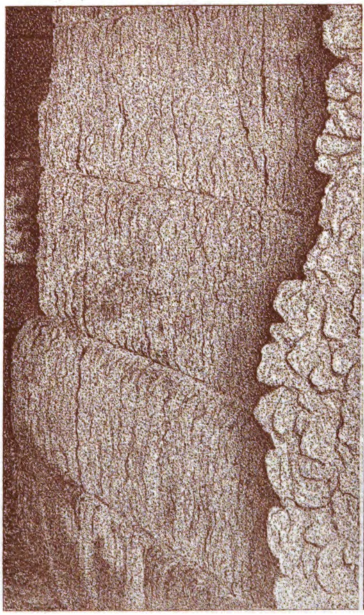
Opus Quadratum et Reticulatum
Murus in Aventino B.C. 640.



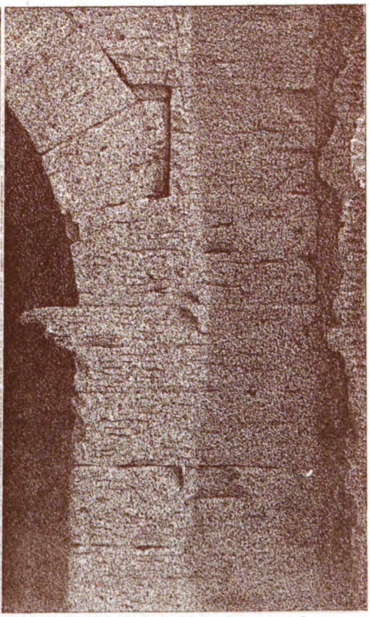
Opus Quadratum
Murus Regum in Foro Augusti B.C. 564.



Opus Quadratum et Incertum.
Tabularium B.C. 500?



Opus Quadratum Aevi Imp.
Arcus Dolabellae A.D. 1.

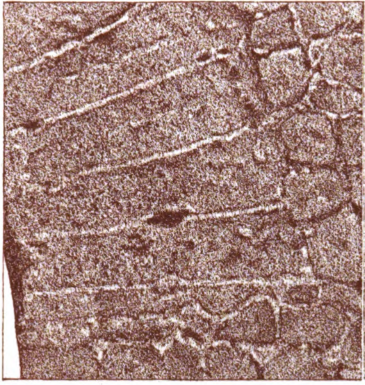


J. Jobbins.

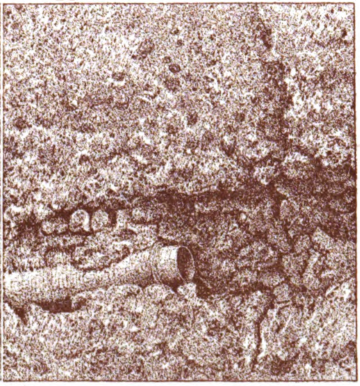
PL 3

Opus Incertum. (Rubble.)

Emporium B.C. 175.

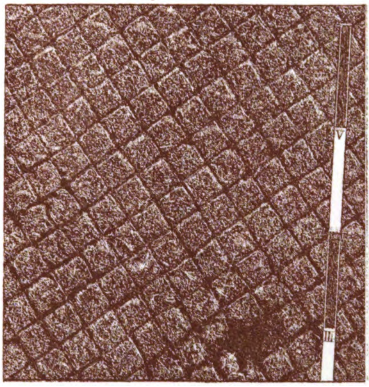


Murus in Palatino B.C. 253.

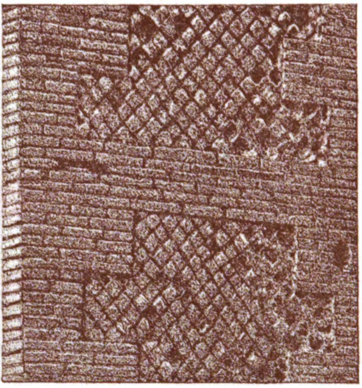


Opus Reticulatum

Muro Torto T. Syllae B.C. 85.

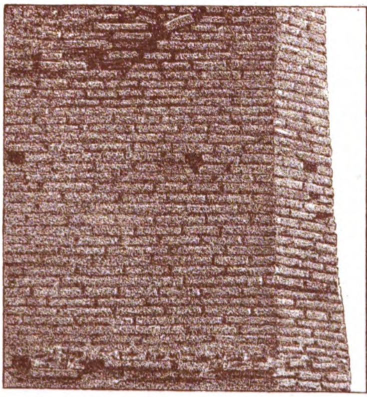


Castellum Aquae Trajani A.D. 100.

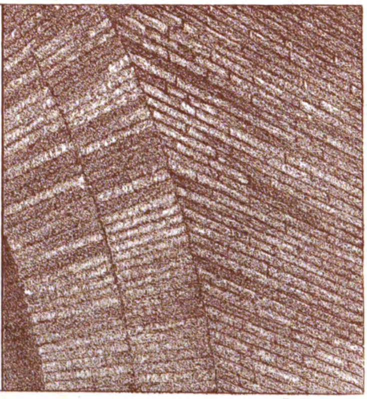


Opus Lateritium

Castra Praetoria A.D. 20.

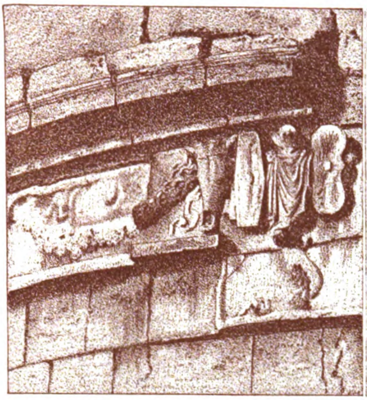


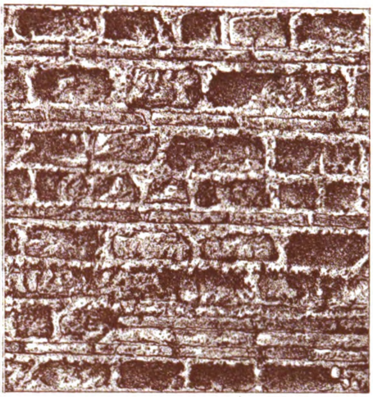
Aquaeductus Neronis in Coelio A.D. 60.

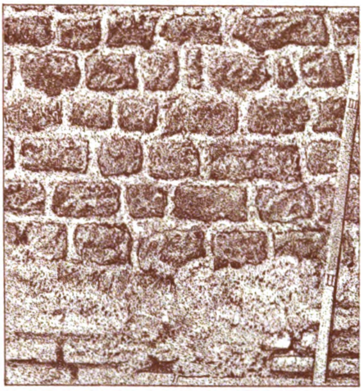


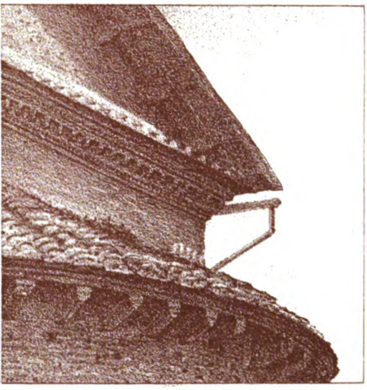
J. Jobbins.

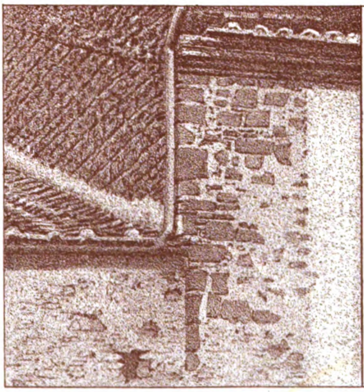
PL.4.

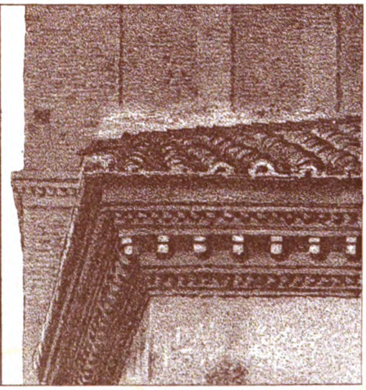

Sepulcrum Caeciliae Metellae B.C. 83.


Constructio Quarti Seculi
Circus Maxentii (Porta) A.D. 304.


Constructio Saracinesca.
S. Sixtus (Vetus) Monast. A.D. 850.


S. Caecilia Transtiberim A.D. 820.


S. Crux in Hierusalem (Monast.) A.D. 950.


S. Georgio in Velabro A.D. 1250.

J. Jobbins.